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Impact of wind turbine sound on annoyance, self-reported sleep disturbance and psychological distress

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Purpose of the research: The present government in the Netherlands intends to realize a substantial growth of wind energy before 2020, both onshore and offshore. Wind turbines, when positioned in the neighborhood of residents may cause visual annoyance and noise annoyance. Studies on other environmental sound sources, such as railway, road traffic, industry and aircraft noise show that (long-term) exposure to sound can have negative effects other than annoyance from noise. This study aims to elucidate the relation between exposure to the sound of wind turbines and annoyance, self-reported sleep disturbance and psychological distress of people that live in their vicinity. Data were gathered by questionnaire that was sent by mail to a representative sample of residents of the Netherlands living in the vicinity of wind turbines. **Principal results:** A dose–response relationship was found between immission levels of wind turbine sound and self-reported noise annoyance. Sound exposure was also related to sleep disturbance and psychological distress among those who reported that they could hear the sound, however not directly but with noise annoyance acting as a mediator. Respondents living in areas with other background sounds were less affected than respondents in quiet areas. **Major conclusions:** People living in the vicinity of wind turbines are at risk of being annoyed by the noise, an adverse effect in itself. Noise annoyance in turn could lead to sleep disturbance and psychological distress. No direct effects of wind turbine noise on sleep disturbance or psychological stress has been demonstrated, which means that residents, who do not hear the sound, or do not feel disturbed, are not adversely affected.

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